

Shell evolution in neutron-rich nuclei towards $N=40$

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Far from the valley of beta stability, the nuclear shell structure undergoes important and substantial modifications. In medium-light nuclei, interesting changes have been observed such as the appearance of new magic numbers, and the development of new regions of deformation around nucleon numbers that are magic near stability. The observed changes help to shed light on specific terms of the effective nucleon-nucleon interaction and to improve our knowledge of the nuclear structure evolution towards the drip lines. The possibility of having a good theoretical description of these phenomena is essential to allow a deep insight into the nuclear effective interaction, to interpret the structure of nuclei far from stability, to predict the position of the drip-lines and to understand the nucleosynthesis pathways.

In the last few years, particular effort has been put on studying light and medium-mass neutron-rich nuclei where these effects manifest more dramatically. Detailed nuclear structure information is becoming available both with stable and radioactive beams nowadays and deeper insight on nuclei approaching the drip line is foreseen with the future radioactive beams facilities. The status of the present scenario in the mass region around $N=40$ will be discussed, with particular regard to shape evolution along isotopic chains and the phenomenon of shape coexistence.